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catches in the Barents Sea region  
(ICES subarea I) between 1950 and 2010**

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**PRELIMINARY ESTIMATE OF TOTAL RUSSIAN FISHERIES CATCHES IN THE BARENTS SEA REGION  
(ICES SUBAREA I) BETWEEN 1950 AND 2010**

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## Abstract

The International Council for the Exploration of the Sea (ICES) maintains a publicly accessible database presenting reported landings by fishing country, taxon, statistical subareas of the major FAO statistical area 27, and year for the period 1950-present. Although some data on discards and illegal fishing are known as part of the ICES stock assessment process, relevant details of these are deemed confidential, and the public landings database does not contain all these data. Furthermore, in many cases a portion of the Russian catch from the Barents Sea has not been reported to ICES for particular years. Here, we reconstructed the total fisheries removal by Russia using publically available data, by adding estimates of the following categories to the reported ICES data: unreported legal landings, unreported landings from poaching, discards, and catch from the subsistence and recreational fisheries. Total removals by the Russian fishing fleet in ICES subarea I of FAO 27 for the period 1950-2010 were estimated to be 27.5 million tonnes, which is 36% greater than the total landings of 20,297,201 t presented officially by ICES for the same period. Unreported industrial catch, their discards, subsistence catch, and recreational catch each contributed 7.6%, 18.3%, 0.03% and 0.34%, respectively, to the total reconstructed catch.

## INTRODUCTION

The Barents Sea was among the first areas of the world to develop large-scale, commercial fishing. On average, commercial fishing in the Barents Sea corresponds to around 5% of global reported catches, and Russian fisheries catch in the Barents Sea fishery accounts for approximately 39% of the total Barents Sea reported landings (Spiridonov and Nikolaeva 2005a). For our purposes, the Barents Sea region consists of the Barents Sea and the White Sea, and is bordered by the Norwegian Sea in the west, the Svalbard archipelago and Bear Island in the northwest, Franz-Josef Land in the northeast, and Novaya Zemlya and the Kara Sea in the east (Figure 1). It extends between the latitudes 82° - 59° N and 15° - 68° E longitude (Matishov *et al.* 2011). It covers approximately 1.5 million km<sup>2</sup> of surface area and has an average depth of

200 m (Spiridonov and Nikolaeva 2005a; Matishov *et al.* 2011). The ichthyofauna is composed of around 182 species and subspecies, belonging to 59 families, of which 21 species and subspecies are commercially targeted by Russian fisheries (Karamushko 2008). Russian commercial fishing activities in the Barents Sea existed since the 15<sup>th</sup> century, but was primarily artisanal in nature, with oar powered vessels and hand lines. Two main fleets existed and operate in the Barents region, the Arkhangels'sk fleet and the Murmansk fleet. The first steam trawler in the Arkhangels'sk region was introduced in 1906 and by 1913 there were four in operation (Helin 1964). In 1916, the Soviet Union built the city Murmansk to serve as an industrial and fisheries center (Helin 1964), and this, along with improvements in technology, e.g., in 1931 the first diesel operated trawler was introduced, resulted in growth of the fishing fleet from 17 fishing vessels in 1927 to 60 by 1933 (Matishov *et al.* 2004).

The year 1950 marks the start of the trawling era in Russian fishing history, as that was the year the first large stern trawlers were introduced, enabling fishing in more distant areas. From that point onwards, the Barents Sea fishery was largely dominated by the demersal trawl gear, with limited use of longlines, gillnets, purse seines, and Danish seines. In 1955, the number of trawlers in the Murmansk fleet alone reached 562 (Vassiliev, 1997 in Grekov and Pavlenko 2011).

In 2005, the total Russian Federation fishing fleet (including fleets outside of the Barents region) had 2977 vessels, of which 2522 are capture vessels, 39 factory vessels, 369 freezer vessels, and 47 scientific and educational vessels (EUROFISH 2005). In 2007, the Russian Barents Sea groundfish fishery is still mainly operated by demersal trawl (93% of total catch), followed by longline (7%), and hand line (0.07%), while the pelagic fishery consist mainly of pelagic trawl (85%) and purse seine (15%) (ICES 2011a).

The objective of our study was to reconstruct total Russian fisheries catches (or fisheries removals allocated to Russia during the Soviet Union period) in the Barents Sea region for the period 1950-2010. Time series data on total fisheries removal are crucial to fisheries management, as they allow for the assessment of the populations upon which fisheries depends (Caddy and Gullard 1983). While ICES stock assessment working groups do consider data on discards and unreported catches, these data are never made publically available due to misplaced confidentiality and political reasons, despite being a public resource (Zeller *et al.* 2011). As actual fisheries catches are usually higher than the reported data would

suggest (Wielgus *et al.* 2010; Zeller *et al.* 2011) we hope that this study will help in highlighting the importance of unaccounted fisheries catches, help policy makers in making sustainable fisheries decisions, and inform the public on actual levels of fisheries extraction in the region.

## METHODS

The International Council for the Exploration of the Sea (ICES) maintains a publicly accessible database presenting reported landings by country, taxon, statistical area, and year for the period 1950-present (<http://www.ices.dk/fish/CATChSTATISTICS.asp>). Here, we refer to these data as '*ICES baseline landings*'. The database does not contain data on discards and other unreported catch. Additionally, a portion of the Russian catch from the Barents Sea has not been reported to ICES for certain years. As the aim of this study was to determine total catches (as opposed to baseline landings), five different components were estimated and added to the ICES baseline landings: unreported legal landings, unreported landings (mainly the result of organized crime and/or poaching), discards, subsistence catch, and recreational catch.

Furthermore, since the former Soviet Union only began reporting landings data to ICES in 1955, there are no catch data for the period 1950-1954 in the ICES database. However, the Food and Agriculture Organization of the United Nations (FAO) does present data for this five-year period (<http://www.fao.org/fishery/statistics/en>) in their database. Thus, we prorated the Soviet Union FAO data for the 1950-1954 time period with the average ICES baseline landings for the years 1955 and 1956, for each taxon, in order to generate the missing baseline landings data. These generated data were subsequently considered part of the ICES baseline landings and not as unreported legal landings. The tonnage of these ICES generated data, per taxon and per year, was usually between 92-105 % of the same FAO corresponding data.

ICES baseline landings for the period 1950-1991 are reported as landings of the former Soviet Union, while the data for 1992 and thereafter are reported as landings of the Russian Federation. In order to extract only the Russian landings prior to 1992, a disaggregation of the former Soviet Union landings was performed based on Zeller and Rizzo (2007).

## Unreported legal landings

All landings that were obtained by legal fishing methods and within the allowed annual quota for the species, but have not been reported to ICES were considered as unreported legal landings. Data on unreported legal landings predominantly came from ICES working group reports or from national sources. Unreported landings of Atlantic cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*) were obtained from the ICES Arctic fisheries working group report (ICES 2009), while data for Atlantic salmon (*Salmo salar*) came from the ICES working group report on North Atlantic salmon (ICES 2011c). Atlantic herring (*Clupea harengus*) data were extracted from Kuznecov (1960), capelin (*Mallotus villosus*), saithe (*Pollachius virens*), navaga (*Eleginus nawaga*), redfish (*Sebastes* spp.), European plaice (*Pleuronectes platessa*), and Greenland halibut (*Reinhardtius hippoglossoides*) from Mokievsky (2001), and northern prawn (*Pandalus borealis*) from Ivanov (1999). Additional data for saithe were included as well (Borisov *et al.* 2003). In a few instances, the data referred to unreported catch in subarea I + subarea II of FAO 27, and in those cases unreported data were proportionally assigned to subarea I based on the ratio of ICES baseline landings in subarea I and subarea II for the particular year and/or taxon. In some cases, assumptions of unreported landings were made, as reported landings for that particular year were zero. Although there were no references that stated unreported landings in those years, there were also no records available indicating that the fisheries for the particular species was closed, or collapsed during that year. Hence, it was assumed that landings were not reported due to poor data recording systems. The assumptions were made based on the average of the two closest previous years with documented landings. These include the following species and years: haddock (1959-1961); saithe (1959-1961); navaga (1955-1965, 1976-1978); wolfishes (*Anarhichas* spp.) (1950-1954); Greenland halibut (1959-1968); skates - family Rajidae (1950-1977), and long rough dab (*Hippoglossoides platessoides*) (1991-1993). In cases with documented fisheries closure, a landing of zero tonnes was accepted.

## *Unreported landings from poaching*

Poaching in the Barents Sea exists for Atlantic cod, haddock, and Atlantic salmon and these catches go unreported. For Atlantic cod and haddock these activities operate on the scale of organized crime and include transshipping, document falsification, and intentional misreporting of the cargo. Poaching for Atlantic salmon is practiced by domestic poachers. Good records on the likely amount of unreported Atlantic cod and haddock by Russian vessels is kept by the Norwegian Directorate of Fisheries

(Anonymous 2005, 2006, 2007, 2008, 2009). Reports for 2002 and 2003 are not publicly available, but are summarized elsewhere (Burnett *et al.* 2008). These reports are based on inspections of Russian vessels by Norwegian authorities. These inspections occurred for the first time in 2002 and were not performed before. The reports contain summarized data from FAO 27 subarea I + subarea II. The data for subarea I were extracted based on the assumed equality in proportion of ICES baseline landings and poaching for particular year/species between the two subareas. It is important to note that these reports do not contain any data on unreported catches by Russian vessels in the 'Grey Zone' (disputed EEZ areas) of the Barents Sea, as the Norwegian inspectors do not have the authority to inspect vessels fishing in those waters. Thus, poaching activities are likely higher in these areas with the bi-lateral agreement resolving these disputed areas, this issue has been addressed.

For the purpose of the reconstruction, it was assumed that poaching activities for Atlantic cod and haddock existed since the introduction of the quota system in Russia in 1975, but were not detected until 2002, as there were no targeted inspection attempts made earlier. It is reasonable to conclude that before 1975, there were no unreported landings from poaching (i.e., fishing in excess of quota), since fishing vessels could land anything they were able to catch. The ratio of unreported catch/ICES baseline landings were calculated for the Atlantic cod for the nine year period 2002-2010 (for 2009-2010 the assumption was made that the ratio of unreported catch for reported catch was the same as in 2008). These nine ratios were summed, an additional value of zero was added to maintain a more conservative approach, and divided by ten which yielded an index of 0.29. For haddock, this index was 0.23 (based on 2005-2010 data). Thus, for all years between 1975 and 2002 (for Atlantic cod) and 2005 (for haddock), 29% and 23% were added to the ICES baseline landing, respectively, while the documented data were utilized for subsequent years based on the Norwegian inspection reports.

In the case of Atlantic salmon, grey literature on poaching activities was consulted, such as Russian websites for recreational fishing or Russian non-government organization websites for nature protection. Based on the most conservative figure and the most reliable source identified (Lajus and Titov, 2000 in Larsen *et al.* 2001), the percentage of unreported salmon from poaching ranged from 50% to 400% of total reported yearly landings from 1991 and onward. We assumed the more conservative estimate of 50%, which was applied to reported landings for the period 1991-2010.

### *Discards*

Discards of Atlantic cod were estimated using the selection curve method applied for Barents Sea and Russian fishing gear by Dingsør (2001b). This level of discard was applied for the period 1950-1987. In 1987, Russia signed an agreement with Norway for a no-discard policy of Atlantic cod (Diamond and Beukers-Stewart 2009), and since then only accidental discards of 2% per year on average were registered (Spiridonov and Nikolaeva 2005b; Burnett *et al.* 2008), with the exception of 1998, which had a 12.7% discard rate.

Navaga and the polar cod (*Boreogadus saida*) are closely related to the Atlantic cod, but there is no available information on discards. Therefore, the discards of these two species were modeled in the same way as for Atlantic cod (Dingsør 2001b), with the exception that the model was applied to the entire time series (1950-2010) as there was no discard ban on these species by Russia that could be identified in the literature.

According to the ICES Atlantic herring working group, discard rates for herring by various monitored countries and regions are usually between 5-15% of the ICES baseline landings (ICES 2011b). Here an average rate of 10% was used. The discard rate of capelin was set at 44% (1950-1991), as this was the most conservative value from the estimated range of 44-133% for capelin discards in the North-East Atlantic (Alverson *et al.* 1994). In 1991, the capelin fishery re-opened after the second collapse in 1987. The discard rate for the period 1991-2010 was roughly halved to 20%, as we assumed the stock to have been better managed.

The data source for estimates of discards of saithe, wolffishes, European plaice, Greenland halibut, long rough dab and lumpfish (*Cyclopterus lumpus*) for the period 1996-2006 was the Russian Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO) (Prischepa *et al.* 2010). Based on these data, discard estimates were made proportionally for the time period that was not covered, assuming that there were no major changes in the discard policies for these species, as none of these species were a primary target of the Russian Barents Sea fishery. Skate discards were calculated according to Dolgov *et al.* (2005).

For haddock discards, there were no relevant data in the literature, thus a rate of 13% was assumed for the period 1950-1987 based on the average discard rate for all countries fishing in the Barents Sea and total landing reported to the discard database (<http://www.fao.org/docrep/008/y5936e/y5936e09.htm>). In 1987, Russia reached an agreement on the discard ban of haddock (Diamond and Beukers-Stewart 2009), thus for the period 1987-2009 a discard rate of 2% was applied.

For redfish, the discards rate varied considerably due to their association with the shrimp fishery. For the period 1983-1987, the Norwegian discard rate was applied to the Russian catches of redfish, due to similarity in the nature of the by-catch and lack of fishing regulations (Dingsør 2001a). For 1978-1982 and 1988-1992, the discard rate of redfish was calculated as 89% of the total landings of northern prawn (Rejwan *et al.* 2001). For 1993-1995, the discard amount in Rejwan *et al.* (2001) was halved to account for the requirement to use sorting grids in the Russian northern prawn fisheries. For 1996-2006, PINRO discard data were used (Prischepa *et al.* 2010), while for the period 2007-2010, estimates were made proportionally to the PINRO data. Finally, for the earliest time period, 1950-1977, a 10% average discard rate was applied. This low rate was applied because the Russian northern prawn fishery in the Barents Sea did not exist prior to 1978, and the majority of the redfish discards are associated with the northern prawn fishing techniques.

For all other catches of unspecified finfish (e.g., miscellaneous marine fishes not elsewhere included), the average discard rate of all of the previous species (excluding lumpfish) of 51% was applied.

For the northern prawn fishery, discards of prawns are thought to be negligible (ICES 2001). Hence, a minimal discard rate of 1% was applied. The discards of red king crab (*Paralithodes camtschaticus*) were set at 6.4% based on the findings of a 13 year long survey in the Bering Sea, where a similar fishery operates (Armstrong *et al.* 1993). This discard rate was also applied to other miscellaneous marine invertebrates.



## Subsistence and recreational fishing

With the exception of Atlantic salmon, records of subsistence and recreational fishing in the Barents Sea region are limited. Subsistence fishing for Atlantic salmon was considered a privilege under the Tzar's Russia and records exist for every fish caught since the end of 16<sup>th</sup> century for 'taxation' purposes. Every 10<sup>th</sup> salmon caught in the subsistence fishery belonged to the Tzar and had to be given to the Tzar's clerks (Lajus *et al.* 2007). Based on the analysis of historical data from the 17<sup>th</sup> century to the beginning of the 20<sup>th</sup> century (Lajus *et al.* 2007), we identified a decreasing trend in this subsistence fishery. This decreasing trend was prorated to the year 2010. Data on Russian recreational salmon fishing in the Barents Sea were taken from the ICES Atlantic salmon working group report (ICES 2011c).

We assumed that subsistence fishing was negligible for any other species besides Atlantic salmon after 1950, based on the estimated five tonnes of subsistence catch of Atlantic cod in 1950 (Mokievsky 2001). We set 1990 as the first year of recreational fishing, as this was the year recreational fishing opened to the public and foreign tourists. Based on all available information, recreational fishing was not commonly practiced before 1990. Considering the report of the ICES working group on recreational fishing (ICES 2010), and based on the recreational fishing of Atlantic cod by other countries in the region, we estimated that Russia's recreational catches account for 2-8% of the country's total catch. As countries with low total landings in ICES (2010) had a higher percentage of recreational fishing, and vice versa, we assumed a 2% recreational catch for Russia since 1990. For the 1950-1998 period, 0.05-0.09% was added. After consultation with Russian websites regarding the common recreational fishery targets, these estimates were applied to navaga, polar cod, wolffishes, haddock, saithe and the other finfish category.

## RESULTS

Total reconstructed catch averaged 411,000 t·year<sup>-1</sup> in the 1950s and 1960s, peaking at 1.21 million t in 1977, declining to the minimum annual catch of 73,700 t in 1990, and then rebounding to approximately 360,000 t·year<sup>-1</sup> in the 1990s and 2000s (Figure 2a). Total removals by the Russian fishing fleet in subarea I of FAO 27 for the period 1950-2010 were estimated to be 27.5 million tonnes, which is 36% greater than the total landings of 20,297,201 t presented officially by ICES for the same period. Unreported industrial catch, their discards, subsistence catch, and recreational catch each contributed 7.6%, 18.3%, 0.03% and

0.34%, respectively, to the total reconstructed catch. Since poaching began in 1975, catch from this activity alone contributed an additional 1,300,000 tonnes of unreported catch from 1975-2010.

The total reconstructed catches were dominated by Atlantic cod, capelin, haddock, and Arctic cod with approximately 44%, 28%, 8%, and 6% contribution to total catch, respectively (Figure 2b). Unreported legal catches were dominated by redfish – over 281,000 t, followed by haddock with around 173,000 t. Discards were dominated by capelin with nearly 2.1 million t, followed by Atlantic cod and redfish with 1.3 million t and 493,000 t, respectively. Combined, recreational and subsistence catches for Atlantic cod, haddock, and Arctic cod accounted for 62,100 t, 18,700 t and 9,200 t, respectively.

## DISCUSSION

This study suggests that during the period 1950-2010, the Russian fleet in the Barents Sea caught around 36% more fish than Russia reported to ICES, and hence to the global community. In comparison, a similar reconstruction of marine catches for the Baltic Sea suggested that 30% more fish were caught than reported by all of the countries in the Baltic Sea region (Zeller *et al.* 2011). While the Baltic Sea reconstruction did not include a category for poaching, large-scale organized poaching does not exist in the Baltic Sea, in contrast to the Russian Barents Sea fisheries. Thus, the 36% estimate of unaccounted Russian catches in the Barents Sea is in accordance with other neighboring regions in the world, and it does not seem to be an overstatement.

Globally, marine by-catch has been estimated at 40% of the total catch (Davies *et al.* 2009). In the case of the Russian Federation and the Barents Sea, discards have been estimated at 25% (Davies *et al.* 2009). This figure, low compared to the global trend, may be attributed to policies which discourage discarding in the Barents Sea (Diamond and Beukers-Stewart 2009). The estimated Russian discard rate of this study is 24.97% for the Barents Sea region, which corresponds closely to the above estimate of Davies and colleagues.

Our estimates of unreported catch of Atlantic cod and haddock (21% and 26%, respectively) are in accordance with the estimated unreported global catches for these species of between 18 and 38% of the reported landings (Agnew *et al.* 2009). Expressed as a percentage of total catches of all species, poaching

in the Barents Sea added 6.9% to the ICES baseline landings for the period 1950-2010, and around 12% for the period 1975-2010. In this study, 1975 was assumed to be the first year of occurrence of substantial poaching. This is similar to an estimate of unreported catch from poaching for the North-East Atlantic of 10% of the reported landings for the period 1980-2003 (Agnew *et al.* 2009).

Recreational and subsistence fisheries contributed only 0.4% to reconstructed catches for the period 1950-2010. Recreational fishing in Russia is still in its infancy, as it was not readily practiced in the past; however it is possible that this figure is higher, as data or information regarding recreational fishing is not readily available. In Baltic Sea, the estimated unaccounted recreational removals was 3% (Zeller *et al.* 2011), while on the global scale the potential contribution of recreational fishing to the reported catch may be up to 12% (Cook and Cowx 2004).

We hope that work such as the present may assist the Russian government and ICES, in improving catch accounting practices in fisheries. Comprehensive and fully transparent accounting of total removals (not only retained and landed catches) is required for a public resource such as fish. It is also highly relevant for the process of moving towards managing fisheries in an ecosystem setting.

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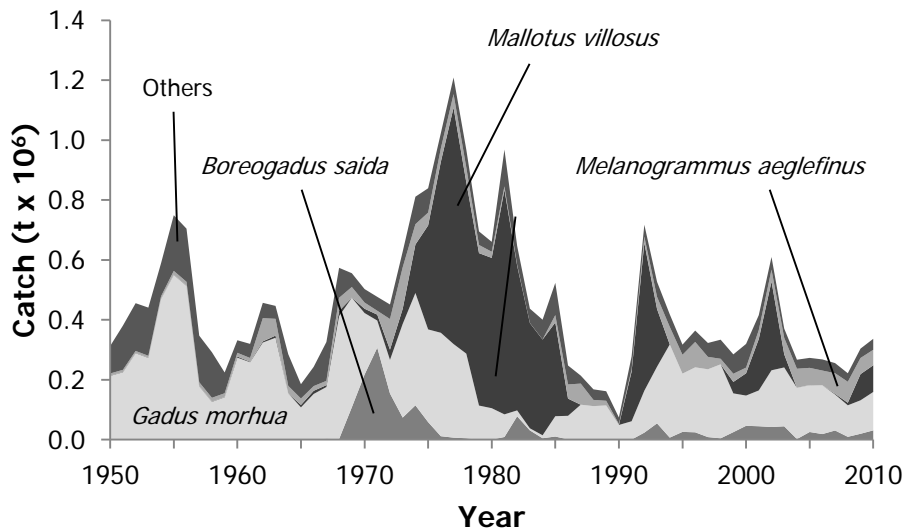
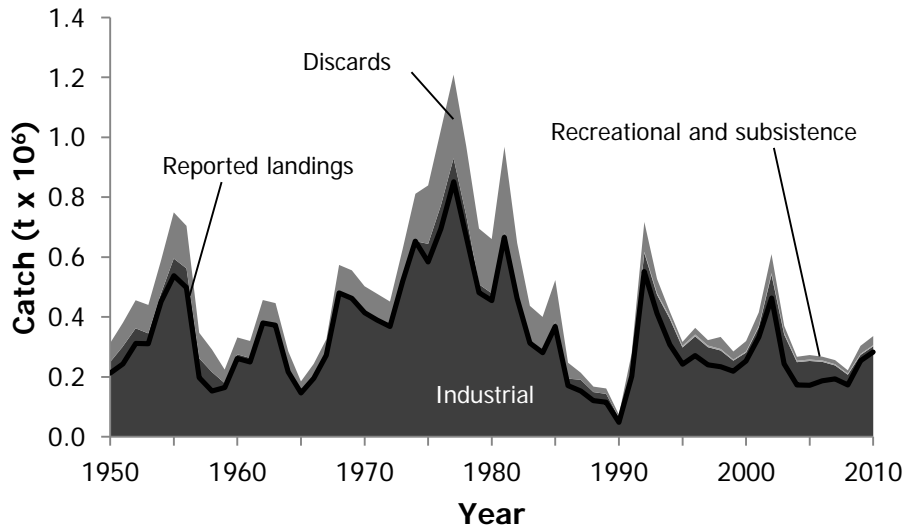
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**Figure 1.** Map of the Russian Barents Sea region, depicting ICES statistical areas as well as the Exclusive Economic Zone (EEZ) of Russia. Note that the disputed areas have now been resolved through mutual agreements.



**Figure 2.** Total reconstructed catch for Russia in the Barents Sea (ICES Area I), 1950-2010, a) by sector, with reported ICES data overlaid as a line graph, and b) by major taxa. 'Others' represents 31 additional taxonomic categories.

**Appendix Table A1. FAO landings vs reconstructed catch (in tonnes) by sector for the EEZ of Russia Barents Sea, 1950-2010.**

Year	FAO landings	Reconstructed total catch	Industrial	Recreational	Subsistence	Discards
1950	211,880	313,000	250,000	-	156	62,900
1951	243,754	381,000	302,000	-	159	78,600
1952	311,795	455,000	362,000	-	165	93,600
1953	310,561	441,000	345,000	-	173	95,000
1954	451,235	589,000	479,000	-	156	110,000
1955	538,255	749,000	595,000	-	164	154,000
1956	497,882	704,000	562,000	-	170	142,000
1957	197,939	347,000	262,000	-	162	85,000
1958	152,142	292,000	216,000	-	156	75,300
1959	164,873	224,000	179,000	-	154	45,100
1960	261,912	332,000	275,000	-	153	56,400
1961	249,668	320,000	263,000	-	157	56,600
1962	380,414	457,000	382,000	-	194	74,300
1963	372,478	446,000	374,000	-	178	72,000
1964	216,928	285,000	219,000	-	175	66,300
1965	146,383	185,000	148,000	-	167	36,600
1966	194,864	243,000	196,000	-	170	47,000
1967	272,117	326,000	273,000	-	167	52,600
1968	480,040	574,000	481,000	-	183	92,500
1969	462,344	556,000	463,000	-	232	92,500
1970	413,607	503,000	414,000	-	283	88,300
1971	389,118	477,000	390,000	-	347	86,700
1972	368,307	451,000	369,000	-	313	82,100
1973	520,833	628,000	521,000	-	301	106,000
1974	652,737	811,000	653,000	-	298	158,000
1975	583,879	839,000	644,000	-	234	195,000
1976	694,198	1,020,000	772,000	-	141	252,000
1977	851,051	1,210,000	930,000	-	137	279,000
1978	668,853	969,000	738,000	-	138	231,000
1979	481,389	695,000	509,000	-	125	186,000
1980	455,121	660,000	479,000	-	123	181,000
1981	665,763	968,000	682,000	-	198	286,000
1982	462,005	647,000	467,000	-	208	180,000
1983	312,271	437,000	314,000	-	153	123,000
1984	280,612	400,000	283,000	-	144	117,000
1985	368,401	523,000	385,000	-	170	138,000
1986	170,709	247,000	194,000	-	189	53,100
1987	152,682	214,000	190,000	-	205	23,600
1988	120,596	168,000	149,000	-	164	18,200
1989	115,007	162,000	143,000	-	156	18,100
1990	48,257	73,700	63,900	1,000	94	8,750
1991	201,948	278,000	225,000	1,420	34	51,000
1992	552,087	717,000	614,000	3,710	34	99,500
1993	411,849	527,000	474,000	5,580	34	47,300
1994	307,623	418,000	394,000	7,360	34	17,100
1995	242,515	317,000	298,000	5,590	34	13,000
1996	270,713	364,000	335,000	6,420	7	22,100
1997	240,010	323,000	299,000	5,580	7	18,000
1998	233,485	334,000	288,000	5,190	7	40,100
1999	218,549	285,000	254,000	3,810	7	26,900
2000	253,353	319,000	281,000	3,610	7	34,800
2001	332,596	416,000	366,000	3,960	3	45,400
2002	462,726	610,000	541,000	5,610	3	63,200
2003	243,514	371,000	341,000	5,960	3	23,300
2004	172,502	267,000	249,000	4,890	3	13,100
2005	172,355	273,000	253,000	4,810	3	15,000
2006	186,892	268,000	250,000	4,610	3	12,700
2007	192,789	255,000	238,000	4,340	3	13,500
2008	172,654	221,000	207,000	3,700	3	11,100
2009	253,545	304,000	273,000	3,780	3	26,800
2010	282,639	337,000	302,000	3,780	3	30,400



**Appendix Table A2.** Reconstructed catch for the EEZ of Russia in the Barents Sea by species, 1950 - 2010.

<b>Year</b>	<b><i>Boreogadus saida</i></b>	<b><i>Gadus morhua</i></b>	<b><i>Mallotus villosus</i></b>	<b><i>Melanogrammus aeglefinus</i></b>	<b>Others</b>
1950	1	213,000	1,010	7,000	91,900
1951	1	225,000	1,010	7,170	148,000
1952	1	288,000	1,010	6,580	159,000
1953	1	273,000	1,010	6,160	161,000
1954	1	470,000	1,010	7,770	110,000
1955	1	550,000	1,010	12,500	186,000
1956	1	513,000	1,010	12,500	177,000
1957	1	178,000	1,010	12,500	156,000
1958	1	126,000	1,010	12,500	152,000
1959	1	141,000	1,010	12,500	69,300
1960	1	274,000	3,590	12,500	41,900
1961	1	258,000	1,760	12,500	47,000
1962	1	324,000	3,840	77,600	51,100
1963	1	340,000	7,230	56,100	43,100
1964	1	154,000	56	25,200	106,000
1965	1	108,000	8,130	21,400	47,800
1966	776	152,000	10,600	15,700	64,200
1967	3,220	172,000	6,260	14,300	130,000
1968	2,030	410,000	17,400	43,800	100,000
1969	108,000	366,000	436	35,700	46,000
1970	217,000	206,000	14,400	20,700	45,000
1971	307,000	90,700	19,700	13,000	46,400
1972	154,000	112,000	34,200	102,000	48,500
1973	73,500	313,000	50,500	139,000	52,400
1974	114,000	375,000	162,000	67,900	91,800
1975	58,400	309,000	347,000	42,900	81,300
1976	11,300	345,000	571,000	44,900	50,800
1977	6,510	313,000	790,000	45,200	55,300
1978	4,390	283,000	572,000	49,500	59,700
1979	142	113,000	509,000	27,200	45,200
1980	3	105,000	502,000	20,600	33,000
1981	8,640	75,600	750,000	11,100	123,000
1982	77,800	19,800	483,000	2,900	62,900
1983	30,700	6,980	351,000	300	47,800
1984	4,510	9,910	320,000	400	65,700
1985	10,200	67,890	313,000	24,600	107,000
1986	543	78,800	57,400	47,400	63,200
1987	85	116,000	0	70,600	26,600
1988	3	112,000	0	20,700	35,200
1989	180	114,000	0	15,500	31,900
1990	57	48,800	0	3,390	21,500
1991	109	61,100	166,000	7,730	42,900
1992	23,200	140,000	494,000	21,100	39,400
1993	54,200	189,000	193,000	40,700	50,100
1994	6,550	311,000	0	58,700	41,800
1995	25,700	195,000	0	63,000	33,800
1996	24,300	217,000	0	84,800	37,900
1997	8,330	226,000	0	41,500	46,400
1998	4,200	247,000	0	18,500	63,700
1999	24,900	129,000	38,300	27,200	64,700
2000	46,000	101,000	74,300	19,100	79,000
2001	44,600	120,000	172,000	29,900	49,700
2002	42,000	189,000	296,000	40,000	42,000
2003	44,400	197,000	43,800	55,000	30,900
2004	1,840	171,000	3	63,900	30,100
2005	25,400	157,000	493	57,100	33,300
2006	18,400	163,000	0	49,300	37,100
2007	30,400	120,000	2,399	68,700	33,800
2008	9,290	105,000	8,400	70,200	28,400
2009	19,400	112,000	87,500	53,900	31,200
2010	30,800	128,000	89,100	51,800	36,600